1. Write a program which allows the user to enter n numbers (n should be input by the user at the beginning of the program). Your program should print the sum of all of the even numbers that the user then enters.

2. 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder (IE: $2520\%1 = 0, 2520\%2 = 0, \ldots, 2520\%10 = 0$). Write a program that finds the smallest positive number that is evenly divisible by all of the numbers from 1 to 20?

3. Write a program that asks the user to input a number, n, and then print the sum of all numbers between 1 and n (inclusive) which are divisible by 4.

4. $n!$ is defined as $n * (n-1) * (n-2) * (n-3) * ... * (1)$. Thus, 4! is equal to $4 * 3 * 2 * 1 = 24$. Write a program that, given a number n from the user, prints out $n!$. $0! = 1$. *Warning: Factorial grows very quickly (factorially, in fact). You should only be able to compute low values of* $n!$ *before your program gives nonsensical results. This is okay.*. Solve this using loops.

   (a) For a bonus, why does your program break when given values such as 15!?

5. Create a program that accepts an integer value from the user. Then print out this number in 8 bit binary (we can assume that all inputs will be $0 \leq n \leq 255$). If the user input the number 6, we would output: 00000110.

6. Write a method signature for a method, called *add*, that takes three integers as an input, and returns the result of adding them.

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7. Write a method signature for a method, called *quadFormula*, that takes three integers as input, and returns the quadratic formula of the three integers.

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8. **Find five syntactical errors in the following snippet of code**:

```
for(int i = 0, i =< 6; i+)
   int value = i * 2;
   System.out.println(value)
}
```

9. Find at least five **syntactical** errors in the following program:

```
int j = 2.0;
answer = 0;
for(i = j; i < 12 i ++)
       answer = answer + Math.pow{i, 2);
}
```

10. The following code snippet is meant to find the sum of all of the numbers between 1 and 100. Find three **logical** errors:

```
int sum = 0;
for(int i = -1; i > 100; i ++){
       sum -= i;
}
```

Indicate what kind of error and if it's a compile time or runtime error, if any, the following will produce:

11. For each of the following, indicate whether there will be a run-time error, compile-time error, or no error.
    (a) int x = 6 / 0;
    (b) System.out.println(8 / 0);
    (c) System.out.println(8.0 / 0.0);
    (d) System.Out.println("Hello world!");
    (e) System.out.println("hello world);
    (f) int j = 13.5;
    (g) char c = 'l';
    (h) double r = (int) 6.0;
    (i) int q = 6 + 10
    (j) int a = 5;
        int b = 5;
        int result = 1 / (a - b);

12. For each of the following, evaluate what the value of the variable will be.
    (a) double v = 3/4;
    (b) double m = 3.0/4;
    (c) double n = (double) (3/4);
    (d) int i = (int) 3.8;
    (e) int j = (int) 3.4;

(f) boolean b = (v == 0);

(g) boolean a = (1 < 2 && 3.5 > 3.9);

(h) boolean c = (1 < 2 || 3.5 > 3.9);

13. This is a program, stored in *FaultyProgram.java*, which is meant to perform some calculations. After reading in an integer from the user, it will do one of three things. If the user enters 1, it will ask for a radius and volume and compute the volume of a sphere. If the user enters 2, it will ask for the radius of a circle and compute its area. If the user enters 3, it will ask for a, b, and c, and compute the hypotenuse of a triangle (the side which is equal to 0).
This program has many logical, syntactical, and grammatical errors. Even if it compiles, it may not give the right answer. Work through and fix as many bugs as possible.

```
public class faultyProgram{
   public static Void main(String args)
      int pi = 3.14;
      System.out.println("This is a test program!");
      System.out.println("Menu:")
      System.out.println("1: Compute volume of sphere");
      System.out.println("2: Compute area of circle");
      Systemout.println("3: Compute hypotenuse of triangle");
      System.println("Please enter an integer: ");
      double option = IO.readInt();

      if(option = 1){
         System.out.println("Please enter a radius (double): ");
         double radius = IO.readDouble()
         double volume = (radius * radius * radius) * (4/3) * pi;
         System.out.println("Volume of sphere with radius " + radius + " is: " + volume);
      }else if(option == 2){
         System.out.println("Please enter a radius (double): ");
         double radius = IO.readString();
         double area = (radius * radius) * pi;
         System.out.println("Area of circle with a radius of " + radius + "is: " + area);
      }else if(option = 3){
         System.out.println("Please enter a, or 0 if unknown (double): ");
         double a = IO.readDouble();

         System.out.println("Please enter b, or 0 if unknown (double): ");
         double b = io.readDouble();

         System.out.println("Please enter c, or 0 if unknown (double): ");
         double b = IO.readDouble();

         if(a == 0){
            a = Math.sqrt(Math.pow(c, 2) - Math.pow(b, 2));
            System.out.println("a: " + a + ", b:" + b + ", c: " + c);
         }else if(b == 0){
            b = Math.sqrt(Math.pow(c, 2) - Math.pow(a, 2));
            System.out.println("a: " + a + ", b:" + b + ", c: " + c);
         }else if(c == 0){
            c = Math.sqrt(Math.pow(a, 2) + Math.pow(b, 2));
            System.out.println("a: " + a + ", b:" + b + ", c: " + c);
         }else{
            System.out.println("None of the sides are unknown! Uh-oh!");
         }
      }else{
         System.out.println("Invalid number entered!");
   }
}
```